REMARKS

Claim Status

Claims 1-7 and 37-44 are particularly amended herein to proceed the application towards an allowance. Support for the amendments can be found in the Specification of the present application as originally filed (e.g. page 20, lines 10-11; page 21, line 12 to page 22, line 4). No new matter is introduced by these amendments.

Applicants' reply regarding statements made in the Advisory Action

The examiner has stated in the Advisory Action that the request for reconsideration does not place the application in condition for allowance. Applicants submit that the application should be allowed for the following reasons.

The examiner has upheld the rejection of Claim 7 under 35 U.S.C. 112 first paragraph, written description, for failing to provide a statement by Applicants or attorney of record "that the deposit has been made under the terms of the Budapest treaty and that all restrictions imposed by the depositor on the availability to the public of the deposited material will be irrevocably removed upon the granting of a patent, would satisfy the deposit requirements. See CFR 1.808". Applicants have been unable to identify this quotation.

Applicants respectfully submit that according the MPEP, such a statement is not necessary. From MPEP 2405: "37 CFR 1.803 indicates that a depository will be recognized as acceptable for the purposes of these regulations if it is either an International Depositary Authority established under the Budapest Treaty, or if it is a depository recognized as suitable by the commissioner." ATCC is included in the list of IDAs recognized under the

Budapest Treaty. Copies of Receipts of deposits to ATCC were submitted in response to the first Office Action.

The MPEP further provides guidelines for the specific identification of a deposit in the specification. From MPEP 2406.01 "37 CFR 1.804(a) ...specifies that the biological material deposited must be specifically identified in the application for patent as filed...The description in the Ludnak application as filed (now patent 4,594,325) provides a suitable illustration of the specific identification and description which are required in an application as filed".

The specific identification and description in Ludnak is as follows: "The subject cell line referred to as WI-L2-729 has the A.T.C.C. designation number CRL 8062, having been deposited on Apr. 2, 1981". This specific identification and description, held to be suitable by the MPEP, does not recite that the deposit has been made under the Budapest Treaty, the address of the depository, or a statement about deposit maintenance and availability, as the examiner suggests. Thus, applicants submit that the statement in the application as filed is suitable for 35 U.S.C. 112 first paragraph, written description purposes.

The examiner further states that "the suggestion by Examiner Strzelecka that Applicants claim SEQ ID NO:1 was rebutted by Ms. Schuster with a statement that SEQ ID NO:1 cannot be claimed because it was a known BAC". This statement is incorrect and, if made, it was made in error. A description of the sequencing of this BAC clone can be found on page 16 lines 8-19 of the application as filed. The sequence of this BAC clone, BAC31A8, can be found in Appendix A of the application as filed. Even if the sequence of the BAC clone had been known at the time of the invention, however, it would not have rendered obvious the isolation of a specific gene from the BAC clone any more than the completion of the Human Genome Project would render obvious the isolation of genes from the human genome.

Applicants' response to arguments made in Final Office Action

A) The examiner maintained the rejection of claims 1-6 and 37-44 under 35 U.S.C. 112, first paragraph, written description, stating that applicants define "proteorhodopsin gene" as "any-rhodopsin-like gene sequences retrieved from naturally occurring members of the domain Bacteria" and applicants have not defined to what extent sequences have to be "rhodopsin-like" to be a rhodopsin-like gene. The examiner further states that "rhodopsin-like...can mean that as long as there is one nuclotide in common between the sequence of rhodopsin and the sequence of "rhodopsin-like gene", this condition is fulfilled."

Applicants respectfully submit that the application as filed clearly states that proteorhodopsin is "rhodopsin-like" in that it has seven transmembrane domains and a retinal binding pocket, typical features of the rhodopsin protein family (see page 17, lines 18-25). Thus, the proteorhodopsin gene is defined as a gene retrieved from naturally occurring members of the domain Bacteria that encodes a protein having seven transmembrane domains and a retinal binding pocket. Applicants respectfully submit that proteorhodopsin was defined in the application as originally filed and that the rejection should be withdrawn.

The examiner further objects to the language "gene isolated from" in claim 1 and "genomic fragment" in claim 3. The claims have been particularly amended to omit this language. Applicants respectfully submit that this rejection is moot in light of the amendments and should be withdrawn.

The examiner further states that the possession of 30 sequences of proteorhodopsin genes is not representative of the whole genus. Claim 1 has been particularly amended to overcome this rejection. Therefore, applicants respectfully submit that this rejection is moot in light of the amendments and should be withdrawn.

B) The examiner maintained the rejection of claim 7 under 35 U.S.C. 112, first paragraph, as discussed above. Applicants state that the deposit was made in a suitable manner and that the statement made in the specification referring to this deposit was complete at the time the application was filed.

C) The examiner maintained the rejection of claims 1, 2, 5, and 37 under 25 U.S.C. 102(b) over Katajima et al. The examiner states that "the fact that nucleic acid encoding a rhodopsin-like protein of Katajima et al came from a different organism, does not impose a structural limitation on the nucleic acid".

Applicants respectfully submit that this is not correct. There were two families of rhodopsins known at the time this invention was filed. A description of these families is as follows, from "Bacterial Rhodopsin: Evidence of a New Type of Phototrophy in the Sea", Beja et al, Science, Vol 389, Spetember 2000, pp. 1902-1906.

"The visual rhodopsins, found in eyes throughout the animal kingdom, are photosensory pigments. Archaeal rhodopsins, found in extreme halophiles, function as light-driven proton pumps (bacteriorhodopsins), chloride ion pumpos (halorhodopsins), or photosensory receptors (sensory rhodopsins). The two protein families show no significant sequence similarity and may have different origins. They do, however, share identical topologies characterized by seven transmembrane α-helices that form a pocket in which retinal is covalently linked, as a protonated Schiff base, to a lysine in the seventh transmembrane helix (helix G)". Thus, while these two protein families have identical topologies, their sequences, and hence their gene structure, are very different.

In this patent application, the inventors describe a third rhodopsin family called proteorhodopsins. Proterhodopsins share identical topology to the archaeal rhodopsins and the visual rhodopsins, in that they have seven transmembrane domains and a retinal binding pocket. (The topology of the proteorhodopsin protein seq ID 7 is shown in Fig 5, and described on page 5, lines 18-25. The topology of various proteorhodopsin variants is shown in Fig. 38, and described on page 21, line 25 to page 22, line 4). Members of the proteorhodopsin family share high sequence identity. Variants of the Monterey bay library share at least 97% identity over 248 amino acids. Variants from Antarctic marine bacterioplankton share 78% identity over 248 amino acids with the Monterey Bay variants. (See page 21, lines 20-25). While proteorhodopsin variants are highly similar in sequence structure, proteorhodopsins are only distantly related genetically to the other rhodopsin families. In fact, proteorhodopsin shares only 27% amino acid identity with its closest archaeal rhodopsin relative (See Beja et al, ibid). Thus, the fact that the rhodopsin-like protein of Kitajima et al was isolated from an Archaebaceria means that it is only distantly related in genetic sequence to the proteorhodopsins of the present invention, which were isolated from bacteria, and is therefore structurally different from the proteorhodopsins of the present invention. In addition, proteorhodopsins and bacteriorhodopsins have different properties. For example, archaeal rhodopsins must be expressed in their natural organisms to be fully functional, whereas proteorhodopsins can be functionally expressed in E. Coli and other bacteria (see Applicant's reply to first Office Action). In summary, nucleic acids encoding archael rhodopsins are in fact quite structurally different from nucleic acids encoding bacterial proteorhodopsins. Therefore, applicants respectfully submit that the rejection should be withdrawn.

D) The examiner maintained the rejection of claim 6 under 35 U.S.C. 103(a) over Katajima et al. and Monroe et al.; rejection of claims 39 and 41 under 35 U.S.C. 103(a) over Kitajima et al. and Shimono et al.; rejection of claims 40 and 42 under 35 U.S.C. 103(a) over Kitajima et al.,

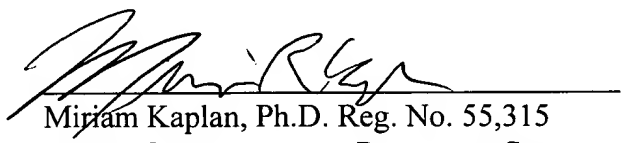
Shimono et al. and Zoluya et al.; rejection of claim 43 under 35 U.S.C. 103(a) over Kitajima et al., Shimono et al. Mollaaghaba et al., and rejection of claim 44 under 35 U.S.C. 103(a) over Kitajima et al., Shimono et al., and Zoluya et al for the reasons discussed in point C. Applicants refer to the arguments for point C above for rebuttal of this rejection. Applicants respectfully submit that since the nucleic acid encoding the rhodopsin-like protein of Katajima et al is structurally very different from the nucleic acid encoding proteorhodopsin, the rejections should be withdrawn.

Conclusion

For the foregoing reasons, it is respectfully submitted that the invention as set forth in amended independent claim 1 and amended dependent claims 1-7 and 37-44 recites subject matter that is fully supported by the specification as filed and is novel under 35 U.S.C. 102(b) over Kitajima et al. In addition, applicants respectfully submit that the invention as set forth in the claims is patentably distinct, under 35 U.S.C. § 103(a), from Katajima et al. and Monroe et al.; Kitajima et al. and Shimono et al.; Kitajima et al., Shimono et al. and Zoluya et al.; Kitajima et al., Shimono et al., and Mollaaghaba et al.; and Kitajima et al., Shimono et al., and Zoluya et al. Accordingly, claims 1-7 and 37-44 are respectfully submitted to be patentable and therefore should be allowed.

This submission and Request for Continued Examination are submitted to be a bona fide attempt to place the present application in a condition for allowance without adding new matter. Favorable consideration and a Notice of Allowance of all pending claims 1-7 and 37-44 are therefore respectfully solicited.

Respectfully submitted,



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